

# Division IV Design Considerations

## Chapter IV-4 Multi-Modal Safety

### IV-4-1 Introduction

The consideration of safety for all users is an important and fundamental requirement in the design of any roadway facility.

In the majority of cases, collisions on roadways and roadway shoulders involve motorists, pedestrians, or bicyclists. Designing roadways for the safety of all modes can help reduce collisions and resulting injuries and fatalities.

It is an unreasonable expectation that injuries and fatalities can be eliminated altogether. Resources typically do not allow for this and, furthermore, it is impossible to completely control the actions of every roadway user. Transportation agencies are, however, expected to make every effort possible to ensure the safety of all users.

This chapter discusses some of the key design elements that affect safety and mobility.

**Figure IV-4.1 – Multi-Modal Transportation Facility**



(Source: Pacific Avenue, Tacoma, WA)

### IV-4-2 Definitions

**motorist** A person riding or maneuvering a motorized vehicle.

**pedestrian** A person on foot, in a wheelchair, or walking a bicycle.

**bicyclist** A person riding or maneuvering a vehicle having two tandem wheels, a minimum of 14" (35 cm) in diameter, propelled solely by human

power, upon which any person or persons may ride. A three-wheeled adult tricycle is considered a bicycle.

#### IV-4-3 Design Considerations

The purpose of any transportation project is to address one specific issue or a combination of issues. Regardless of the specific issue(s), safety is generally an underlying consideration in the development of a project.

During the planning stages, roadway safety issues are identified. In the project development phase, project proponents identify solutions to mitigate those safety concerns.

Many of the design considerations affecting roadway safety for motorists, also affect safety for bicyclists and pedestrians. However, there are challenges in accommodating all modes of travel within limited right of way. Some important factors to consider include:

**Access control** – Access management is one of the most significant factors in providing a safe, efficient roadway for all modes. The design features and operating characteristics of roadways require careful planning, so that they reduce traffic conflict points and minimize interference among different modes of travel.

**Well functioning facilities** – Provide adequate width for roadways, bikeways, and walkways; adequate sight distance; accessible grades; and alignment (in order to avoid blind corners). Common problems, such as poor drainage, need to be avoided.

**Operating/posted speeds** – On urban and suburban roads, operating speeds have greater variation (depending on the time of day), than rural roads. Higher speeds and greater speed variance, under free-flowing conditions, are significant factors that influence roadway safety. Design features that reduce the variance in motor vehicle speeds (e.g., traffic control devices, signing and marking) reduce the potential for collisions. Collisions involving motor vehicles and bicyclists or pedestrians, generally result in more severe injuries to bicyclists and pedestrians at higher motor vehicle speeds.

**Accessible and appropriately located transit facilities** – Transit centers and stops need to be located in areas of supporting densities (a minimum of 4 to 7 units per acre). Developing pedestrian facilities necessary to access transit can enhance the safety of both motorists and pedestrians.

**Intersections** – Safety improvements at intersections can be accomplished through channelization, appropriate sight distances, lighting, signing and traffic control devices.

**Pedestrian and bicycle facilities** – Paved shoulders offer motorists, pedestrians, and bicyclists comfortable facilities to travel on. “Green Shoulders” are an alternate solution that provide environmental benefits along with the surface area needed. Sidewalks, paths and walkways that are relatively clear of obstructions, separated from traffic lanes, and connected to important destinations, increase pedestrian safety and mobility. Proper design and operation of pedestrian crossings also increases pedestrian safety.

#### IV-4-4 Balancing Considerations

All jurisdictional levels require the provision of safe facilities for motorists, pedestrians, and bicyclists. The intended result of providing safety on the roadway and roadside for motorists, pedestrians, and bicyclists is to minimize the probability and reduce the severity of a collision involving any of these road users.

Identifying opportunities to maximize the mobility and safety for the majority of road users driving motor vehicles, while increasing the safety and mobility for other road users (particularly when right of way is limited), is a primary challenge in the project development process. For example, widening a roadway through an urban area may result in higher vehicle speeds. The roadway alteration that may be positive for the vehicular traveler may result in difficulties or hazards to pedestrians. The increased width may create challenges for some pedestrians because of increased crossing times, and the higher vehicle speeds result in collisions with pedestrians that have more severe injuries.

A roadway developed for multi-modal use has many outcomes, including that it is safe and comfortable for all users; it encourages people to bicycle and walk to their destinations, freeing some capacity for additional motorized trips; may be designed to lower motor vehicle speeds than a road that accommodates fewer modes of travel; it might be more expensive than a road that accommodates fewer modes, though addressing safety for all users will reduce societal costs incurred from accidents; roads with reduced driveways and access points will reduce the conflicts between the modes; and it may incorporate more architectural and aesthetic elements to blend these modes together within the context of the local setting.

#### IV-4-5 Governing Regulations and Directional Documents

*Draft Pedestrian Guide*, American Association of State Highway and Transportation Officials (AASHTO), Washington, D.C., 2003.

*Highway Safety Design and Operations Guide*, AASHTO, Washington, D.C., 1997.

*Local Agency Guidelines*, WSDOT, M 36-63.

*A Policy on Geometric Design of Highways and Streets*, 4<sup>th</sup> ed. (Green Book), AASHTO, Washington, D.C., 2001.

*Rules of the Road*, Revised Code of Washington (RCW) 46.61.

Task Force on Geometric Design, *Guide for the Development of Bicycle Facilities*, AASHTO, Washington, D.C., 1999.

#### IV-4-6 Additional Resources

Lalani, Nazir, and the ITE Pedestrian and Bicycle Task Force, *Alternative Treatments for At-Grade Pedestrian Crossings*, Institute of Transportation Engineers, Washington, D.C., 2001.

*Pedestrian Facilities Guidebook: Incorporating Pedestrians into Washington's Transportation System*, OTAK, Incorporated, Kirkland, WA, 1997.

*Recommendations to Reduce Pedestrian Collisions*, Washington Quality Initiative's Pedestrian Safety Improvement Team and WSDOT, Olympia, WA, 1999.

Staplin, L. K., *Highway Design Handbook for Older Drivers and Pedestrians*, Federal Highway Administration (FHWA), McLean, VA, 2001.

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